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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,390	06/23/2006	Koji Okazaki	TOW-153US	9028
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EXAMINER ESSEX, STEPHAN J				
ART UNIT		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/584,390

Applicant(s)

OKAZAKI, KOJI

Examiner

STEPHAN ESSEX

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/23/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date 9/2/2009, 10/9/2009
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. The applicant's amendment filed on August 10, 2009 was received. Claim 6 was cancelled. Claim 1 was amended. Claims 10 and 11 were added.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Response to Arguments

3. Applicant's arguments with respect to claims 1-5 and 7-9 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. In view of Applicant's amendment of claim 1, the Examiner withdraws the previously set forth rejection of claims 1, 8 and 9 as detailed in the Office Action dated May 29, 2009.
5. In view of Applicant's canceling of claim 6, the Examiner withdraws the previously set forth rejection of claim 6 as detailed in the Office Action dated May 29, 2009.

6. Claims 1, 8, 9 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poppinger (WO 2002/053402) in view of Kususe (JP 2002-190313, see machine translation) and Ando et al. (PG Pub 2003/0087149 A1).

Regarding Claim 1, Poppinger discloses a fuel cell vehicle (abstract), wherein:

- having a vehicle body (1, Fig. 1) and a polymer electrolyte fuel cell (11, 11'; P4/L16-30) mounted in said vehicle body (1),
- said fuel cell (11, 11') is provided under a passenger compartment (2, Fig. 1) of said vehicle body (1, Fig. 1; P2/L38 – P3/L1; P4/L30-32);
- said fuel cell (11, 11') including a stack formed by stacking a plurality of unit power generation cells (P4/L28-30), a stack container case (10, "module"; P4/L29-30) containing said stack, and a condenser (30, "heat exchanger", Fig. 4; provided in said stack container case (P5/L36-P6/L2)
- an air (Fig. 2-4, "Air") supplied from an air inlet (20) of said vehicle body (1) cools the case (10).

Additionally, Poppinger discloses the need of a fuel cell system that is cooled in a self-aspirating manner while remaining spatially-confined. Poppinger does not explicitly disclose the components of the PEM fuel cell nor disclose the mechanics of the fuel cell cooling, wherein:

- in said polymer electrolyte fuel cell, each of said unit power generation cells includes an electrolyte electrode assembly and a first separator and a second separator sandwiching said electrolyte electrode assembly, said electrolyte electrode assembly including an anode electrode, a cathode electrode, and a

solid polymer electrolyte interposed between said anode electrode and said cathode electrode;

- said stack is immersed in an electrically insulating liquid coolant inside said stack container case to cool said stack;

However, Kususe discloses an immersion-cooled polymer electrolyte fuel cell (abstract), wherein:

- in said polymer electrolyte fuel cell, each of said unit power generation cells (30) includes an electrolyte electrode assembly (20) and a first separator (26) and a second separator (27) sandwiching said electrolyte electrode assembly (20), said electrolyte electrode assembly including an anode electrode (22), a cathode electrode (23), and a solid polymer electrolyte (21) interposed between said anode electrode (22) and said cathode electrode (23);
- said stack (1) is immersed in an electrically insulating liquid coolant (4) inside said stack container case (2) to cool said stack (1);

Poppinger and Kususe are combinable because they are concerned with the same field of endeavor, namely fuel cells.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to use the immersion cooled fuel cell of Kususe, as taught by Poppinger, to provide a fuel cell for a vehicle that can be optimally-cooled by a passive ambient air stream while reducing space without the need of active circulation components.

Poppinger further discloses the need for an area to cool the coolant produced from the cooling of the immersed fuel cell (Page 5/L33-36; Fig. 4), but the reference does not explicitly disclose a fuel cell wherein:

- a plurality of protrusions protruding toward said stack are provided on an inner surface of said stack container case, and said protrusions are exposed from the liquid surface of the liquid coolant.

However, Ando discloses

- wherein a plurality of protrusions (12, "ribs", Fig. 6; [0124]) protruding toward said stack (30, "cells") are provided on an inner surface (11, "inner wall surface") of said stack container case (10, "cooling box").

While Ando does not explicitly teach that protrusions are exposed from the liquid surface of the liquid coolant, it is Examiner's position that such an arrangement is inherent to the invention of Ando given that the ribs extend the entire vertical length of the inner wall surface of the cooling box, while the injection header and drain headers that allow for the inlet and outlet of coolant are provided at lower positions.

Modified Poppinger and Ando are combinable because they are concerned with the same field of endeavor, namely the cooling of electrochemical cells components.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate the ribs of Ando, into the system of Poppinger, to provide cooling channels for cooling the fuel cell.

Regarding Claims 8 & 9, modified Poppinger discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need for a liquid coolant to

immerse the fuel cell ([0010]). While the reference does not explicitly disclose the vehicle, wherein the liquid coolant is a liquid which can be boiled into vapor in the nucleate boiling state or the boiling temperature of the liquid coolant is lower than an operating temperature of said stack by 10°C to 25°C, said limitations are directed to a manner of operating disclosed fuel cell. Regarding said limitations, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Regarding Claim 11, modified Poppinger discloses:

- an air discharge assistance mechanism (6, "auxiliary blower") for assistance to discharge the air supplied from said air inlet to the outside of said vehicle body.

7. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poppinger (WO 2002/053402) in view of Kususe (JP 2002-190313, see machine translation) and Ando et al. (PG Pub 2003/0087149 A1), as applied to claims 1, 8, 9 & 11 above, and further in view of Tuma et al. (PG Pub 2006/0088746 A1).

Regarding Claims 2-4, Modified Poppinger discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need to use electrically insulating

materials that are in fluid communication with the coolant to prevent electrical communication between, wherein polytetrafluoroethylene is used ([0019]/Sentence 2) but does not explicitly disclose coating the fuel cell stack case or condenser with a dielectric material such as polytetrafluoroethylene (PTFE) for the purpose of electrically insulating electrically-conducting components, wherein:

- wherein coating is applied to at least one of a surface of said condenser and an inner surface of said stack container case

However, Tuma discloses coating electrically-conducting metal components with a dielectric material, wherein

- a polytetrafluoroethylene (PTFE) coating is applied to flow transfer layers ([0056]/L9-12)

Modified Poppinger and Tuma are combinable because they are concerned with the same field of endeavor, namely the fuel cells.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to use PTFE to coat any metal component in fluid communication with the fuel cell, in this case the condenser and stack container case, for the purpose of preventing electrical communication.

Regarding Claim 5, Modified Poppinger discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need to cool a direct immersion fuel cell ([0010] & [0011]), but the reference does not explicitly disclose a fuel cell wherein:

- said stack includes a cooling plate having at least one groove for supplying the liquid coolant into said stack.

However, Tuma discloses a two-phase fuel cell cooling system wherein:

- said stack includes a cooling plate (172, 174; Fig. 3) having at least one groove (180, 184; Fig. 3) for supplying the liquid coolant into said stack [0074].

Modified Poppinger and Tuma are combinable because they are concerned with the same field of endeavor, namely the cooling of fuel cells.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate the cooling channels in an immersion-cooled fuel cell of Poppinger, as taught by Tuma, to cool a direct immersion fuel cell.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Poppinger (WO 2002/053402) in view of Kususe (JP 2002-190313, see machine translation) and Ando et al. (PG Pub 2003/0087149 A1), as applied to claim 1 above, and further in view of Kobayashi et al. (US Patent 4,036,291).

Regarding Claim 7, Modified Poppinger discloses all of the claim limitations as set forth above. Additionally, Kususe discloses the need for a condenser in which vapor is condensed into liquid (abstract), but the reference does not explicitly disclose a fuel cell wherein:

- a trapping section for trapping the condensed liquid coolant at said condenser, and a circulation mechanism for allowing the liquid coolant to flow from said trapping section back to said stack container case.

However, Kobayashi discloses:

- a trapping section (36, 38, Fig. 5) for trapping the condensed liquid coolant (40) at said condenser (22), and a circulation mechanism (32) for allowing the liquid coolant (40) to flow from said trapping section back to said stack container case (10).

Modified Poppinger and Kobayashi are combinable because they are concerned with the same field of endeavor, namely the cooling of heat-emitting electrical devices.

It would have been obvious to a person having ordinary skill in the art at the time of the claimed invention to incorporate a liquid collection and return circulation section within a condenser of Kobayashi, in the system of Poppinger, for the purpose of providing a means of cooling a fuel cell.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Poppinger (WO 2002/053402)) in view of Kususe (JP 2002-190313, see machine translation) and Ando et al. (PG Pub 2003/0087149 A1), as applied to claims 1, 8, 9 & 11 above, and further in view of Lee et al. (PG Pub 2003/0219635 A1).

Regarding Claim 10, Modified Poppinger does not explicitly disclose a fuel cell wherein:

- the liquid coolant is a lower alcohol or a solvent of fluorine compound.

Fly teach

However, Lee discloses:

- a fuel cell wherein the liquid coolant is a lower alcohol (methanol) or a solvent or fluorine compound (see claims 1 and 3).

Modified Poppinger and Lee are combinable because they are concerned with the same field of endeavor, namely the cooling of fuel cells.

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use methanol as the cooling fluid in the system of Poppinger because methanol freezes at lower temperatures.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHAN ESSEX whose telephone number is (571) 270-7866. The examiner can normally be reached on Monday - Friday, 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SJE

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795